READ ME FIRST – Overview of EL's Common Core Learning Targets

What We Have Created and Why

- A group of 15 EL staff members wrote long-term learning targets aligned with the Common Core State Standards for English Language Arts (K-12), Disciplinary Reading (6-12), and Math.
- EL is committed to purposeful learning; to that end, learning targets are a key resource for students, teachers, and instructional leaders. Our hope is that these targets help launch teachers into what we've learned is the most powerful work: *engaging students* with targets during the learning process.
- The Common Core State Standards (CCSS) unite us nationally. The standards, along with these long-term learning targets provide us with a common framework and language.
- We offer these targets as an open educational resource (OER), intended to be shared publicly at no charge.

Next Steps for Schools and Teachers

- **Determine importance and sort for long-term vs. supporting targets.**
  In most cases, there are more targets here than teachers can realistically instruct to and assess, and not each target is "worthy" of being a long-term target. We suggest that leadership teams, disciplinary teams, or grade-level teams analyze these targets to determine which ones you consider to be truly long-term versus supporting. Reorganize them as necessary to make them **yours**.
- **Build out contextualized supporting targets and assessments**, looking back at the full text of the standard. Our intention is to offer a "clean translation" of the standards in student-friendly language to serve as a jumping-off point for teachers when developing daily targets used with students during instruction and formative assessment.

Resources

- A specific resource we recommend is *The Common Core: Clarifying Expectations for Teachers & Students* (2012), by Align Assess, Achieve, LLC and distributed through McGraw Hill. These are a series of grade level booklets for Math, ELA, and Literacy in Science, Social Studies & Technology. They include enduring understandings, essential questions, suggested daily-level learning targets and vocabulary broken out by cluster and standard. Find more information at www.mheonline.com/aaa/index.php?page=flipbooks. (Each grade-level booklet costs $15-25.)
- We also recommend installing the free Common Core Standards app by MasteryConnect. It's very useful to have the standards at your fingertips! http://itunes.apple.com/us/app/common-core-standards/id439424555?mt=8

Quick Links

Math Common Core State Standards and Long-Term Learning Targets
Kindergarten

CCS Standards: Counting and Cardinality	Long-Term Target(s)
K.CC.1. Count to 100 by ones and by tens.	I can count to 100 by ones and by tens.
K.CC.2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	I can count forward starting at any number I know.
K.CC.3. Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).	I can write numbers from 0 to 20. I can use numbers to show how many objects there are in a group.
K.CC.4. Understand the relationship between numbers and quantities; connect counting to cardinality. − When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. − Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. − Understand that each successive number name refers to a quantity that is one larger.	I can count the objects in a group one-by-one. I can tell how many objects are in a group. I can explain what happens to the number of objects in a group when another object is added.
K.CC.5. Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.	I can count objects to find out how many are in a group. I can create a group of objects to show any number from 1-20.
K.CC.6. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. (Include groups with up to 10 objects.)	I can compare groups of objects using the words "greater than", "less than", or "equal to" by matching and counting.
K.CC.7. Compare two numbers between 1 and 10 presented as written numerals.	I can compare two numbers between 1 and 10 when they are written as numerals.
CCS Standards: Operations and Algebraic Thinking	**Long-Term Target(s)**
K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings[1], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. [1] Drawings need not show details, but should show the mathematics in the problem.	I can show addition and subtraction in many ways (with objects, fingers, drawings, mental images, sounds, verbal explanations, expressions, equations, or acted-out situations).

K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	I can solve story problems by adding and subtracting. (within 10)
K.OA.3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).	I can break down numbers (up to 10) into added pairs in two or more ways.
K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.	When given any number from 1-9, I can show the number needed to make 10.
K.OA.5. Fluently add and subtract within 5.	I can add and subtract within 5 with fluency.
Standards: Number & Operations in Base Ten	**Long-Term Target(s)**
K.NBT.1. Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	I can explain how I use groups of tens and ones to represent any number from 11 to 19.
CCS Standards: Measurement & Data	**Long-Term Target(s)**
K.MD.1. Describe measurable attributes of objects	I can describe objects by how they can be measured.
K.MD.2. Directly compare two objects with a measurable attribute in common	I can compare two objects by their measurements.
K.MD.3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Limit category counts to be less than or equal to 10.)	I can sort objects into categories and put the categories in order by number of objects.
CCS Standards: Geometry	**Long-Term Target(s)**
K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.	I can describe familiar objects using the names of shapes. I can describe where objects are located by using terms such *as above, below, beside, in front of, behind,* and *next to*.
K.G.2. Correctly name shapes regardless of their orientations or overall size.	I can identify shapes no matter what size they are or how they are placed.
K.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	I can determine if shapes are two-dimensional or three-dimensional.
K.G.4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having	I can compare 2D and 3D shapes using a variety of features.

sides of equal length).	
K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	I can create models of shapes I see by building or drawing them.
K.G.6. Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*	I can create larger shapes by using several smaller shapes.

Math Common Core State Standards and Long-Term Learning Targets
Grade 1

CCS Standards: Operations and Algebraic Thinking	**Long-Term Target(s)**
1.OA.1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (See Glossary, Table 1)	I can solve addition and subtraction word problems up to 20 using a variety of strategies.
1.OA.2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	I can solve addition word problems *(using 3 whole numbers, whose sum is >/= 20.)* using a variety of strategies.
1.OA.3. Apply properties of operations as strategies to add and subtract.[2] *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* (Students need not use formal terms for these properties.)	I can add and subtract using strategies called "properties of operations".
1.OA.4.Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8. Add and subtract within 20.*	I can explain how addition and subtraction are related.
1.OA.5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	I can make connections between counting and addition and subtraction.
1.OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	I can use different strategies to add and subtract numbers. I can add and subtract with fluency within 10.
1.OA.7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.	I can explain the meaning of the equal sign. I can tell whether equations (where we add and subtract) are true or false.

1.OA.8. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ – 3, 6 + 6 = _.*	I can find the missing number in an addition or subtraction equation.
Standards: Number & Operations in Base Ten	**Long-Term Target(s)**
1.NBT.1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.	I can count to 120 from any number less than 120. I can read and write any number up to 120. I can write the number that matches with a group of objects up to 120.
1.NBT.2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones — called a "ten." b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).	I can explain what each digit in a two-digit number represents.
1.NBT.3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	I can use >, = and < to compare two-digit numbers.
1.NBT.4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	I can develop a variety of strategies for adding numbers and explain my thinking.
1.NBT.5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	I can explain how to find 10 more or 10 less than a number using mental math.

1.NBT.6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	I can use a variety of strategies to subtract multiples of 10 (in the range 10-90) and explain my thinking.
CCS Standards: Measurement & Data	**Long-Term Target(s)**
1.MD.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object.	I can compare the length of two objects using a third object.
1.MD.2. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*	I can measure objects using non-standard units.
1.MD.3. Tell and write time in hours and half-hours using analog and digital clocks.	I can tell the time using different clocks (analog & digital; to the half-hour).
1.MD.4. Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	I can organize data. I can compare data from different categories or groups. I can explain what my data represents.
CCS Standards: Geometry	**Long-Term Target(s)**
1.G.1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size) ; build and draw shapes to possess defining attributes.	I can describe the traits that define shapes.
1.G.2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.[1]	I can combine two- or three-dimensional shapes to create a new shape.
1.G.3. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	I can divide shapes into equal parts and use *halves, fourths and quarters* to describe them. I can explain the relationship between halves, fourths and quarters and a whole.

Math Common Core State Standards and Long-Term Learning Targets
Grade 2

CCS Standards: Operations and Algebraic Thinking	Long-Term Target(s)
2.OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	I can solve addition and subtraction word problems within 100, using a variety of strategies.
2.OA.2. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. (See standard 1.OA.6 for a list of mental strategies.)	I can mentally add and subtract within 20 with fluency. I can say from memory every sum of two single-digit numbers.
2.OA.3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	I can determine whether a group of objects has an odd or even number of items.
2.OA.4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	I can write an addition equation to show the total number of objects arranged in rectangular arrays (up to 5 X 5).
CCS Standards: Number & Operations in Base Ten	**Long-Term Target(s)**
2.NBT.1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	I can explain what the three digits of a three-digit number represent.
2.NBT.2. Count within 1000; skip-count by 5s, 10s, and 100s.	I can count within 1000. I can skip count by 5s, 10s and 100s.
2.NBT.3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	I can read and write numbers to 1000 using numerals, number names, and expanded form.

2.NBT.4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	I can compare three-digit numbers using the symbols >, =, and <.
2.NBT.5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	I can add and subtract within 100 with fluency. I can explain the relationship between addition and subtraction.
2.NBT.6. Add up to four two-digit numbers using strategies based on place value and properties of operations.	I can add up to four two-digit numbers up to 100.
2.NBT.7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	I can add and subtract within 1000 using a variety of strategies. I can explain the relationship between addition and subtraction.
2.NBT.8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.	I can mentally add and subtract 10 or 100 to any number between 100 and 900.
2.NBT.9. Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)	I can explain why an addition or subtraction strategy works.
CCS Standards: Measurement & Data	**Long-Term Target(s)**
2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	I can measure the length of a variety of objects, using the most appropriate tool.
2.MD.2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	I can measure an object using two different units of length. I can explain how the two measurement relate to each another.
2.MD.3. Estimate lengths using units of inches, feet, centimeters, and meters.	I can estimate length using inches, feet, centimeters, and meters.
2.MD.4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	I can find out how much longer one object is than another and express the difference using standard terms others will understand.
2.MD.5. Use addition and subtraction within 100 to solve word problems involving lengths that are given in	I can solve word problems (within 100) using lengths that are given in the same units.

the same units	
2.MD.6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.	I can represent whole numbers as lengths from 0 on a number line diagram. I can represent whole number sums and differences within 100 on a number line diagram.
2.MD.7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	I can tell time to the nearest 5 minutes when looking at a variety of clocks (analog and digital). I can write time to the nearest 5 minutes using a.m. and p.m.
2.MD.8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?	I can solve word problems with dollars, quarters, dimes, and pennies using the $ and ¢ symbols appropriately.
2.MD.9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	I can make a line plot that shows the length of several objects (or repeated measurements of the same object) using whole numbers.
2.MD.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.	I can use a picture graph and a bar graph to represent the same data set with up to 4 categories. I can use information from picture and bar graphs to solve addition, subtraction and comparison problems.
CCS Standards: Geometry	**Long-Term Target(s)**
2.G.1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (Sizes are compared directly or visually, not compared by measuring.)	I can identify shapes given the number of angles or number of sides. I can draw triangles, quadrilaterals, pentagons, hexagons, and cubes.
2.G.2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	I can divide a rectangle into rows and columns of squares and count to find out the total number of them.
2.G.3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.	I can divide parts of a whole using the words *halves, thirds, half of,* or *a third of.* I can explain how a whole is the same as two halves, three thirds, or four fourths. I can demonstrate that equal parts of the same whole don't have to have the same shape.

Math Common Core State Standards and Long-Term Learning Targets
Grade 3

"Fluency" is defined as accuracy, efficiency, and flexibility. (Russell, S. J. (2000). Developing computational fluency with whole numbers in the elementary grades. *The New England Math Journal, 32*(2), 40-54.)

CCS Standards: Operations and Algebraic Thinking	Long-Term Target(s)
3.OA.1. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*	I can use multiplication to solve problems. I can represent the context of a multiplication problem using drawings and equations.
3.OA.2. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*	I can use division to solve problems. I can represent the context of a division problem using drawings and equations.
3.OA.3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (See glossary, Table 2)	I can use multiplication and division (within 100) to solve word problems. I can represent the context of a multiplication and division problem using drawings and equations. I can fluently use the models of multiplication.
3.OA.4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*	I can find an unknown number in a multiplication or division equation.
3.OA.5. Apply properties of operations as strategies to multiply and divide.[2] (Students need not use formal terms for these properties.) *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 =*	I can analyze the relationship between the four basic operations. I can follow the rules of multiplication and division. I can use the properties of operations as strategies to help me multiply and divide.

16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)	
3.OA.6. Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	I can explain the relationship between multiplication and division.
3.OA.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	I can fluently multiply and divide within 100. I can say from memory every multiplication fact 0-10. I can use my fluency with the multiplication facts 0-10 to help me divide.
3.OA.8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.[3] (This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order.)	I can use all four operations to solve two-step word problems. I can represent the context of a word problem with pictures, models, equations and/or variables. I can check the reasonableness of my answer using a variety of strategies.
3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	I can identify arithmetic patterns. I can explain arithmetic patterns using the properties of operations.
CCS Standards: Number and Operations in Base Ten	**Long-Term Target(s)**
3.NBT.1. Use place value understanding to round whole numbers to the nearest 10 or 100.	I can explain what each digit of a three-digit number represents. I can name the place values of numbers (up to 100). I can round whole numbers to the nearest 10 or 100.
3.NBT.2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	I can explain the relationship between addition and subtraction. I can fluently add and subtract within 1000 using a variety of strategies.

3.NBT.3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	I can use the properties of operations and place value as strategies to help me multiply fluently (one-digit whole numbers by multiples of 10 in the range of 10-90).
CCS Standards: Number and Operations – Fractions Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, 8	**Long-Term Target(s)**
3.NF.1. Understand a fraction 1/*b* as the quantity formed by 1 part when *a* whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by a parts of size 1/*b*.	I can explain what fractions represent. I can recognize fractional parts of a whole.
3.NF.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. b. Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line. [1] Excludes compound units such as cm3 and finding the geometric volume of a container. [2] Excludes multiplicative comparison problems (problems involving notions of "times as much"; see Glossary, Table 2).	I can explain what fractions represent using a number line. I can plot fractions on a number line.

3.NF.3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	I can explain the concept of equivalence. I can reason about fraction size and equivalence using models. I can create equivalent fractions. I can compare two fractions using appropriate mathematical symbols (<, >, =).
CCS Standards: Measurement and Data	**Long-Term Target(s)**
3.MD.1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	I can tell time to the nearest minute. I can use addition and subtraction to solve word problems involving time.
3.MD.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	I can measure liquid volumes and masses of objects using standard units (grams, kilograms, and liters). I can estimate liquid volumes and masses of objects using standard units (grams, kilograms, and liters). I can use models to represent the context of a measurement problem. I can solve problems involving liquid volumes and masses of objects.

3.MD.3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*	I can draw a scaled graph (picture and bar) to represent a data set with several categories. I can use a scaled bar graph to solve problems.
3.MD.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	I can use a ruler to measure lengths accurately to fourths of an inch. I can draw a line plot to represent a data set (using a horizontal scale of appropriate units).
3.MD.5. Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.	I can explain the concept of area measurement. I can describe the area of an object using appropriate units.
3.MD.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	I can find the area of objects using a variety of methods.

3.MD.7. Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	I can analyze the relationship between the concepts of area, multiplication, and addition. I can solve word problems involving area of rectangular figures. I can use models to represent the context of an area problem.
3.MD.8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	I can solve problems involving perimeter of polygons. I can compare the perimeter and area of polygons.
CCS Standards: Geometry	**Long-Term Target(s)**
3.G.1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	I can identify basic geometric shapes by name and attributes. I can compare geometric shapes using their attributes. I can recognize common examples and non-examples of quadrilaterals.

3.G.2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*	I can divide shapes into equal parts. I can express the parts of a shape as fractions.

Math Common Core State Standards and Long-Term Learning Targets Grade 4

"Fluency" is defined as accuracy, efficiency, and flexibility. (Russell, S. J. (2000). Developing computational fluency with whole numbers in the elementary grades. *The New England Math Journal, 32*(2), 40-54.)

CCS Standards: Operations and Algebraic Thinking	**Long-Term Target(s)**
4.OA.1. Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	I can explain what a multiplication equation represents.
4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.[1] (See Glossary, Table 2)	I can explain the relationship between multiplication and addition. I can use multiplication and division to solve problems. I can represent the context of a multiplication and division word problem using drawings and equations.
4.OA.3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	I can solve multi-step word problems using all four operations. I can represent the context of a word problem, (including problems with remainders) using drawings and equations. I can use variables to represent unknown quantities in a problem. I can check the reasonableness of my answer using a variety of strategies.
4.OA.4. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.	I can name the factors of all whole numbers 0-100. I can explain the relationship between factors and multiples. I can determine whether any number 0-100 is a multiple of a given one-digit number. I can determine whether any number 0-100 is prime or composite.

4.OA5. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*	I can create a number or shape pattern that follows a rule. I can describe what I notice about the pattern besides the rule itself.
CCS Standards: Number and Operations in Base Ten Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000	**Long-Term Target(s)**
4.NBT.1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*	I can explain the relationship between digits in different places within a whole number.
4.NBT.2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	I can read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. I can compare multi-digit numbers using the symbols >, =, and <.
4.NBT.3. Use place value understanding to round multi-digit whole numbers to any place.	I can round multi-digit whole numbers to a given place.
4.NBT.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.	I can explain the relationship between addition and subtraction. I can add and subtract multi-digit whole numbers fluently.
4.NBT.5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	I can multiply whole numbers using a variety of strategies. (4 digits x 1 digit; 2 digits x 2 digits). I can prove my calculations are correct using equations, rectangular arrays, and/or area models.

4.NBT.6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	I can explain the relationship between multiplication and division. I can find whole-number quotients and remainders using a variety of strategies. I can prove my calculations are correct using equations, rectangular arrays, and/or area models.
CCS Standards: Number and Operations – Fractions Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.	**Long-Term Target(s)**
4.NF.1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	I can explain the concept of fraction equivalence. I can create equivalent fractions. I can reason about fraction size and equivalence using visual models.
4.NF.2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	I can compare two fractions with different numerators and denominators using appropriate mathematical symbols (<, >, =). I can prove my fraction comparisons using visual models.

4.NF.3. Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	I can describe a fraction as the sum of smaller fractions. I can prove my fraction decomposition using equations and visual models. I can add and subtract fractions and mixed numerals with like denominators using a variety of strategies. I can solve problems involving addition and subtraction of fractions (with like denominators). I can represent the context of a fraction word problem using a variety of models.

4.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*	I can multiply a fraction by a whole number. I can represent fractions using various multiplication equations. I can solve word problems involving multiplication of fractions by a whole number.
4.NF.5. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.) *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*	I can create equivalent fractions whose denominators are 10 and 100. I can add fractions with denominators of 10 and 100. I can explain my strategies for adding fractions.
4.NF.6. Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*	I can explain the relationship between decimals and fractions. I can use decimals to describe fractions with denominators of 10 and 100.

4.NF.7. Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	I can compare two decimals to the hundredths place using appropriate mathematical symbols (<, >, =). I can prove my decimal comparisons using models.
CCS Standards: Measurement and Data	**Long-Term Target(s)**
4.MD.1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.*For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*	I can describe the approximate sizes of units within one measurement system (metric, standard, time, etc.). I can compare larger and smaller units within the same measurement system. I can convert a given measurement into an equivalent unit.
4.MD.2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	I can solve measurement word problems involving distances, time, mass, volume, and money. I can represent measurement quantities using diagrams (with a measurement scale).
4.MD.3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*	I can use area and perimeter formulas to solve problems. I can represent the context of an area and perimeter word problem using a variety of models.
4.MD.4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*	I can make a line plot to display a data set involving fractions of a measurement unit. I can use a line plot to solve fraction word problems involving addition and subtraction.

4.MD.5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.	I can describe angles using geometric vocabulary. I can explain how to measure an angle.
4.MD.6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	I can measure and draw angles using a protractor.
4.MD.7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	I can determine the measurement of a larger angle using smaller angle measurements. I can find unknown angles using a variety of strategies. I can solve word problems that involve unknown angle measurements.
CCS Standards: Geometry	**Long-Term Target(s)**
4.G.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	I can draw points, lines (parallel and perpendicular), line segments, rays, and angles (right, acute, obtuse). I can identify points, lines, line segments, rays, and angles in other shapes.
4.G.2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	I can classify shapes based on lines and angles. I can identify right triangles.

4.G.3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	I can identify a line of symmetry in a two-dimensional figure. I can recognize when a figure is symmetrical and when it is not. I can draw lines of symmetry (two-dimensional).

Math Common Core State Standards and Long-Term Learning Targets
Grade 5

"Fluency" is defined as accuracy, efficiency, and flexibility. (Russell, S. J. (2000). Developing computational fluency with whole numbers in the elementary grades. *The New England Math Journal, 32*(2), 40-54.)

CCS Standards: Operations and Algebraic Thinking	**Long-Term Target(s)**
5.OA.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	I can communicate using mathematical symbols (parentheses, brackets, braces). I can evaluate expressions that involve parentheses, brackets, and/or braces.
5.OA.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	I can translate words into expressions. I can explain the relationship between numbers in an expression (without any calculations).
5.OA.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	I can analyze patterns based on relationships and operations. I can create numeric patterns using given rules. I can graph ordered pairs on a coordinate plane.
CCS Standards: Number and Operations in Base Ten	**Long-Term Target(s)**
5.NBT.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	I can explain the relationship between digits in different decimal places.
5.NBT.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	I can explain the connection between the number of zeros in a number and the multiples of 10. I can explain the connection between the decimal point and multiplying/dividing by 10. I can use exponents to show powers of 10.

5.NBT.3. Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	I can read, write, and compare decimals to the thousandths place. I can explain decimals using base-ten numerals, number names, and expanded form. I can compare decimals using the symbols >, =, and <.
5.NBT.4. Use place value understanding to round decimals to any place.	I can round decimals to any given place.
5.NBT.5. Fluently multiply multi-digit whole numbers using the standard algorithm.	I can fluently multiply multi-digit whole numbers.
5.NBT.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	I can explain the relationship between multiplication and division. I can find quotients using a variety of strategies. I can prove my calculations are correct using equations, rectangular arrays, and/or area models.
5.NBT.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	I can add, subtract, multiply, and divide decimals using a variety of strategies. I can explain the relationship between addition and subtraction. I can prove my calculations are correct using models. I can explain my reasoning and solutions to decimal problems in writing.
CCS Standards: Number and Operations – Fractions	**Long-Term Target(s)**
5.NF.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*	I can add and subtract fractions and mixed numbers with unlike denominators.

5.NF.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*	I can solve word problems involving addition and subtraction of fractions (with unlike denominators). I can represent the context of a fraction word problem using a variety of models. I can use benchmark fractions and number sense to check for reasonable answers.
5.NF.3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	I can explain the relationship between fractions and division. I can solve word problems involving division and express my answers in fraction form. I can represent the context of a fraction word problem using a variety of models.
5.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	I can multiply a whole number or fraction by a fraction. I can prove my product is correct using visual models. I can solve word problems involving multiplication by fractions. I can find the area of a rectangle (with fractional side lengths) using a variety of strategies.

5.NF.5. Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.	I can compare the size of a product to the size of its factors (without performing multiplication). I can explain the result of multiplying a given number by a fraction greater than and less than 1.
5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	I can solve word problems involving multiplication by fractions and mixed numbers. I can represent the context of a fraction word problem using a variety of models.

5.NF.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1] a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?* (Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)	I can explain the relationship between multiplication, division, and fractions. I can represent the context of a word problem (involving division of fractions) using models and equations. I can solve word problems involving division of fractions using a variety of strategies.
CCS Standards: Measurement and Data	**Long-Term Target(s)**
5.MD.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	I can convert among units within one measurement system (metric, standard, time, etc.). I can solve measurement word problems involving conversions. I can represent the context of the measurement word problem using a variety of models.

5.MD.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	I can make a line plot to display a data set involving fractions of a measurement unit. I can use information from a line plot to solve problems.
5.MD.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.	I can explain the concept of volume using unit cubes. I can explain the difference between the volumes of two- and three-dimensional (solid) figures.
5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	I can measure the volume of objects using a variety of methods and the appropriate units.
5.MD.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	I can explain the relationship between the concepts of volume, multiplication, and addition. I can solve real-word problems involving volume. I can represent the context of a volume problem using models.

CCS Standards: Geometry	Long-Term Target(s)
5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).	I can describe a coordinate system using correct vocabulary (axes, origin, points, plane, coordinates, quadrants).
5.G.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	I can graph points on a coordinate plane. I can represent the context of a problem using a coordinate plane. I can explain the meaning of the graph within the context of a real-world problem.
5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	I can reason using the attributes and categories of geometric figures.
5.G.4. Classify two-dimensional figures in a hierarchy based on properties.	I can classify shapes based on properties.

Math Common Core State Standards and Long-Term Learning Targets
Grade 6

Note: *Students should be able to apply all mathematical skills in context (through a word problem, open-ended real-world problem, or contextual scenario) and abstractly (in plain number problems or what the standards term "mathematical problems"). For example, when students are ask to "write, solve, and interpret two-step equations" students should be able to solve equations such as 3x + 2 = -5, and check for the validity of their solution as well as write equations from word problems.*

"Fluency" is defined as accuracy, efficiency, and flexibility. (Russell, S. J. (2000). Developing computational fluency with whole numbers in the elementary grades. *The New England Math Journal, 32*(2), 40-54.)

CCS Standards: Ratios and Proportional Relationships	Long-Term Target(s)
6.RP.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*	I can explain the concept of ratio. I can describe the relationship between two quantities using ratio language.
6.RP.2. Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*[1] (Expectations for unit rates in this grade are limited to non-complex fractions.)	I can explain the concept of unit rate. I can describe a ratio relationship using rate language.

6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	I can explain the relationship between rate, ratio, and percent. I can solve word problems using ratio and rate reasoning.
CCS Standards: The Number System	**Long-Term Target(s)**
6.NS.1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? Compute fluently with multi-digit numbers and find common factors and multiples.*	I can solve word problems involving division of fractions by fractions. I can represent the context of a fraction word problem using a variety of models.

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.	I can fluently divide multi-digit numbers.
6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	I can fluently add, subtract, multiply, and divide multi-digit decimals.
6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2). Apply and extend previous understandings of numbers to the system of rational numbers.*	I can find the greatest common factors of two whole numbers (up to 100). I can find the least common multiple of two whole numbers (less than or equal to 12). I can use the distributive property to express a sum of two whole numbers.
6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	I can explain the meaning of positive and negative numbers. I can use positive and negative numbers to represent quantities in real-world contexts. I can explain the meaning of 0 in a variety of situations.
6.NS.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	I can explain the concept of rational numbers. I can explain the relationship between the location of a number (on a number line or coordinate plane) and its sign. I can locate and plot rational numbers on a number line (horizontal and vertical) and a coordinate plane.

6.NS.7. Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*	I can explain the concept of absolute value. I can interpret statements of inequality using a number line. I can explain the order and absolute value of rational numbers in real-world contexts.
6.NS.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	I can graph points in all four quadrants of a coordinate plane. I can find distances between points using my knowledge of coordinates and absolute value.
CCS Standards: Expressions and Equations	**Long-Term Target(s)**
6.EE.1. Write and evaluate numerical expressions involving whole-number exponents.	I can explain the difference between an expression and an equation. I can write numerical expressions involving whole-number exponents. I can evaluate numerical expressions involving whole-number exponents.

6.EE.2. Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as* $5 - y$. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression* $2(8 + 7)$ *as a product of two factors; view* $(8 + 7)$ *as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas* $V = s^3$ *and* $A = 6 s^2$ *to find the volume and surface area of a cube with sides of length* $s = 1/2$.	I can translate words into expressions. I can read expressions using appropriate mathematical terms. I can evaluate expressions using the order of operations.
6.EE.3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression* $3(2 + x)$ *to produce the equivalent expression* $6 + 3x$*; apply the distributive property to the expression* $24x + 18y$ *to produce the equivalent expression* $6(4x + 3y)$*; apply properties of operations to* $y + y + y$ *to produce the equivalent expression* $3y$.	I can use the properties of operations to create equivalent expressions.
6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions* $y + y + y$ *and* $3y$ *are equivalent because they name the same number regardless of which number* y *stands for. Reason about and solve one-variable equations and inequalities.*	I can identify equivalent expressions.

6.EE.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	I can explain what an equation and inequality represents. I can determine whether a given number makes an equation or inequality true.
6.EE.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	I can explain what a variable represents. I can use variables to solve problems involving expressions.
6.EE.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.	I can write equations to represent real-world problems. I can solve one-step equations involving positive numbers.
6.EE.8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	I can explain the difference between an equation and an inequality. I can write an inequality to represent a real-world problem. I can identify multiple solutions to an inequality. I can represent solutions of inequalities on a number line.
6.EE.9.Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	I can use variables to represent the relationship between quantities in real-world problems. I can explain the relationship between dependent and independent variables. I can analyze the relationship between dependent and independent variables.

CCS Standards: Geometry	Long-Term Target(s)
6.G.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	I can find the area of polygons by composing or decomposing them into basic shapes. I can apply my understanding of shapes to solve real-world problems.
6.G.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	I can explain the volume formula of a rectangular prism using unit cubes. I can find the volume of a rectangular prism using formulas. I can solve real-world problems involving volume.
6.G.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	I can draw polygons in the coordinate plane. I can identify the length of a side using coordinates. I can solve real-world problems involving coordinate planes.
6.G.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	I can represent three-dimensional shapes using nets. I can find the surface area of three-dimensional shapes (using nets). I can solve for surface area in real-world problems involving three-dimensional shapes.
CCS Standards: Statistics and Probability	**Long-Term Target(s)**
6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	I can identify statistical questions. I can explain how data answers statistical questions.
6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	I can describe a statistical data set using center, spread, and shape.
6.SP.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	I can compare a measure of center with a measure of variation.

6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	I can communicate numerical data on a number line (dot plots, histograms, and box plots).
6.SP.5. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	I can summarize numerical data sets. I can analyze the relationship between measures of center and the data distribution.

Math Common Core State Standards and Long-Term Learning Targets
Grade 7

CCS Standards: Ratios and Proportional Relationships	**Long-Term Target(s)**
Analyze proportional relationships and use them to solve real-world and mathematical problems.	
7RP1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction* 1/2/1/4 *miles per hour, equivalently 2 miles per hour.*	I can determine the appropriate unit rates to use in a given situation, including those with fractions.
7.RP2. Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate.	I can recognize, represent, and explain proportions using tables, graphs, equations, diagrams, and verbal descriptions). This means that: • I can compute unit rates. • I can determine whether two quantities represent a proportional relationship. • I can transfer my understanding of unit rates to multiple real-world problems.
7.RP3. Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	I can solve the following types of multistep and percent problems: simple interest, taxes, markups, gratuities and commissions, fees, percent increase and decrease, and percent error.

CCS Standards: The Number System	**Long-Term Target(s)**
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	

7.NS1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.	I can add and subtract rational numbers. This means that: • I can represent addition and subtraction on horizontal and vertical number lines. • I can subtract a rational number by adding its opposite (additive inverse). • I can use the absolute values of numbers on a number line to illustrate both addition and subtraction. • I can apply properties of operations (commutative, associative, and distributive) to add and subtract rational numbers.
7.NS2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(–1)(–1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $–(p/q) = (–p)/q = p/(–q)$. Interpret quotients of rational numbers by describing real- world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	I can multiply and divide rational numbers. I can apply the commutative, associative, and distributive properties appropriately in multiplying and dividing rational numbers. I can convert a fraction to a decimal using long division. I can explain the difference between a rational and an irrational number.
7.NS3. Solve real-world and mathematical problems involving the four operations with rational numbers.1	I can use the four operations to solve problems involving rational numbers.

CCS Standards: Expressions and Equations	Long-Term Target(s)
Use properties of operations to generate equivalent expressions.	
7.EE1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	I can use the properties of operations to solve linear expressions with rational coefficients.
7.EE2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."*	I can rewrite an expression in different forms to help me understand and solve problems.
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	
7.EE3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	I can use properties of operations to analyze and solve problems with rational numbers in any form (whole numbers, fractions, and decimals). I can convert between whole numbers, fractions and decimals. I can estimate and compute in my head to determine whether an answer makes sense.

7.EE4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	I can write, solve, and interpret two-step equations using known and unknown values. I can write, solve, and interpret two-step inequalities using known and unknown values. I can represent the solution of an inequality graphically and algebraically.
CCS Standards: Geometry	**Long-Term Target(s)**
Draw, construct, and describe geometrical figures and describe the relationships between them.	
7.G1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	I can solve problems with scale drawings of geometric figures. I can compute actual lengths and area from a scale drawing. I can reproduce a scale drawing using a different scale.
7.G2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	I can draw (freehand, with ruler and protractor, with technology) geometric shapes with given conditions. I can construct triangles from three measures of angles or sides. I can notice when the given conditions determine a unique triangle, more than one triangle, or no triangle.
7.G3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	I can describe the two-dimensional figures that result from slicing three-dimensional figures.

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	
7.G4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	I know the formulas for the area and circumference of a circle. I can use circle formulas to solve problems. I can explain the relationship between the circumference and area of a circle.
7.G5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	I can use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
7.G6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	I can solve real-world and mathematical problems involving 2-dimensional area (triangles, quadrilaterals, polygons) and 3-dimensional volume and surface area (cubes, right prisms).
CCS Standards: Statistics and Probability	**Long-Term Target(s)**
Use random sampling to draw inferences about a population.	
7.SP1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	I can determine whether generalizations are valid by examining sample size and sampling methods.
7.SP2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*	I can use data from a random sample to draw conclusions and make reasonable arguments about a population. I can describe sample size and sampling methods that will allow me to make more accurate conclusions and arguments.

Draw informal comparative inferences about two populations.	
7.SP3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*	I can compare and draw informal inferences about two populations using measures of center (median, mean) and measures of variation (range), visual overlap, and mean absolute deviation. I can compare the degree of visual overlap of the data plots from two different populations. I can explain what the difference between the two data plots means.
7.SP4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	I can use measures of center and measures of variability to draw informal inferences about two populations.
CCS Standards: Investigate chance processes and develop, use, and evaluate probability models.	
7.SP5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	I can explain why the numeric probability of an event must be between 0 and 1. I can explain the likeliness of an event occurring based on probability.
7.SP6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*	I can determine probability for a single event by collecting and analyzing frequency in a chance process. I can explain the difference between experimental and theoretical probability.

7.SP7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*	I can compare and contrast probability models and explain discrepancies using those probability models.
7.SP8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*	I can design and investigate a simulation that will allow me to collect data to generate frequencies for compound events using sample spaces, organized lists, tables and tree diagrams.

Math Common Core State Standards and Long-Term Learning Targets
Grade 8

CCS Standards: The Number System	**Long-Term Target(s)**
Know that there are numbers that are not rational, and approximate them by rational numbers.	
8.NS1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	I can identify whether a number is rational or irrational by whether its decimal form is exact, repeating, or does not repeat. I can convert repeating decimal numbers into their fraction equivalents.
8.NS2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., √ 2). *For example, by truncating the decimal expansion of* √2, *show that* √2 *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	I can estimate rational and irrational numbers in order to compare their relative size and location on a number line.
CCS Standards: Expressions and Equations	**Long-Term Target(s)**
Work with radicals and integer exponents.	
8.EE1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.*	I can describe and apply the properties of integer exponents to expressions.
8.EE2. Use square root and cube root symbols to represent solutions to equations of the form *x2 = p* and *x3 = p,* where *p* is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	I can solve one-step equations requiring square or cube roots and determine when the solution is rational or irrational. I can evaluate square roots of small perfect squares and cube roots of small perfect cubes. I can explain why √2 is irrational.
8.EE3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.*	I can estimate and compare very large and very small quantities using scientific notation. I can determine how many times bigger one number is than another using scientific notation.

8.EE4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	I can describe when and where to use scientific notation and choose appropriate units for very large and very small numbers. I can compare, interpret and calculate values using scientific notation and decimal equivalents in the same problem.
Understand the connections between proportional relationships, lines, and linear equations.	
8.EE5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	I can compare, contrast, and interpret multiple representations of proportional relationships (graphs, tables, equations, and verbal models). I can graph proportional relationships by using the unit rate as the slope of the graph. I can compare and contrast two different proportional relationships that are represented in different ways, i.e. an equation with a graph.
8.EE6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	I can write and interpret an equation for a line in slope-intercept form and determine the relationship is linear using similar triangles to show the slope is the same between any two points.
Analyze and solve linear equations and pairs of simultaneous linear equations.	
8.EE7. Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	I can write, solve, and interpret the solution set of multi-step linear equations in one variable. This means: • I can determine when a solution gives one solution, infinitely many solutions, or no solutions. • I can apply the distributive property to algebraic expressions. • I can combine like terms to simplify expressions and equations.

8.EE8. Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	I can write, solve, and interpret the solutions to systems of linear equations with two variables graphically and algebraically. This means, in part: • I can recognize and explain the solution to a system of linear equations graphically (as a point of intersection). • I can describe instances when a system of equations will yield one solution, no solutions, or infinitely many solutions.
CCS Standards: Functions	**Long-Term Target(s)**
Define, evaluate, and compare functions.	
8.F1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.1	I can determine if a relation is a function using a table, graph, or set of ordered pairs.
8.F2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	I can compare and contrast multiple representations of (tables, graphs, equations, and verbal models) of two functions. This means that from any type of representation: • I can determine whether the relationship is a function. • I can identify the rate of change and y-intercept for a linear function.
8.F3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	I can determine if a function is linear or non-linear from a table, equation, graph, or verbal model.
Use functions to model relationships between quantities.	

8.F4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, *y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	I can write, graph, and interpret linear functions. This means: • I can construct a function to model a linear relationship from a table of values, two points, or verbal description. • I can determine the rate of change (slope) and initial value (y-intercept) from a table and graph. • I can explain the meaning of the rate of change and initial value of a linear function in terms of the situation it models.
8.F5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	I can describe the relationship between two quantities when given a graph. I can sketch a graph from a verbal description of a function.
CCS Standards: Geometry	**Long-Term Target(s)**
Understand congruence and similarity using physical models, transparencies, or geometry software.	
8.G1. Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.	I can describe and apply the properties of translations, rotations, and reflections on lines, line segments, angles, parallel lines and geometric figures.
8.G2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	I can describe how two figures are congruent if the first figure can be rotated, reflected, and/or translated to create the second figure. Given two congruent figures, I can describe the transformations needed to create the second from the first.
8.G3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	I can describe and apply dilation, translation, rotation, and reflection to two-dimensional figures in a coordinate plane.
8.G4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	I can describe how two figures are similar if the first figure can be rotated, reflected, dilated and/or translated to create the second figure. Given two similar figures, I can describe the transformations needed to create the second from the first.

8.G5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	I can informally prove the following: • The angle-sum theorem; • The properties of angles when parallel lines are cut by a transversal; • The angle-angle criterion for similar triangles.
Understand and apply the Pythagorean Theorem.	
8.G6. Explain a proof of the Pythagorean Theorem and its converse.	I can describe a proof of the Pythagorean Theorem and its converse.
8.G7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	I can determine the unknown side lengths in a right triangle problem using the Pythagorean Theorem.
8.G8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	I can determine the distance between two points in a coordinate plane using the Pythagorean Theorem.
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
8.G9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	I know and can apply the formulas for volumes of cones, cylinders, and spheres.
CCS Standards: Statistics and Probability	**Long-Term Target(s)**
Investigate patterns of association in bivariate data.	
8.SP1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	I can construct and interpret scatter plots. This means: • I can describe the relationships shown in a scatter-plot by identifying patterns such as: clustering; • outliers; • positive or negative association; • linear association; • nonlinear association.
8.SP2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	I can sketch a line of best fit on a scatter plot, justify the location of the line; and explain why or why not a given line is a good fit.
8.SP3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is*	I can write the equation of a line of best fit and use it to make predictions. I can use the slope and y-intercept to describe he relationship represented in a data set.

associated with an additional 1.5 cm in mature plant height.	
8.SP4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	I can construct two-way frequency and relative frequency tables to summarize categorical data. I can use relative frequencies to describe the possible association between two variables of categorical data.

Math Common Core State Standards and Long-Term Learning Targets
High School Algebra 1

Traditional Pathway; see Appendix A of the CCS Standards for information on high school course design: http://www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf

Note: *Students should be able to apply all mathematical skills in context (through a word problem, open-ended real-world problem, or contextual scenario) and abstractly (in plain number problems or what the standards term "mathematical problems"). For example, when students are ask to "write, solve, and interpret two-step equations" students should be able to solve equations such as 3x + 2 = -5, and check for the validity of their solution as well as write equations from word problems.*

Unit 1: Relationships between Quantities and Reasoning with Equations	
CCS Standards: Quantities	**Long-Term Target(s)**
N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	I can choose, apply, and interpret the units for multi-step problems when using formulas, graphs, and other data displays.
N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.	I can analyze data to determine significant patterns (units or scale) that can result in a mathematical model. I can determine appropriate variables from data. I can determine the appropriate units and scale to model data.
N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	I can record data to an appropriate level of accuracy when using different types of measuring devices (e.g. traditional ruler vs. electronic measuring device, stopwatch vs. clock). I can calculate using an appropriate level of accuracy.
CCS Standards: Seeing Structure in Expressions	**Long-Term Target(s)**
A-SSE.1. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*	I can interpret algebraic expressions that describe real-world scenarios. This means : • I can interpret the parts of an expression including the factors, coefficients, and terms. • I can use grouping strategies to interpret expressions.

CCS Standards: Creating Equations	Long-Term Target(s)
A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	I can write, solve, and interpret linear and simple exponential equations and inequalities.
A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	I can write and graph equations that represent relationships between two variables or quantities.
A-CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	I can represent constraints with linear equations, inequalities, and systems of equations or inequalities. I can determine whether solutions are viable or non-viable options, given the constraints provided in a modeling context.
A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	I can solve formulas for a particular variable of interest.
CCS Standards: Reasoning with Equations and Inequalities	**Long-Term Target(s)**
A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	I can explain and justify each step for solving multi-step linear equations.
A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	I can solve multi-step linear equations in one variable including equations with coefficients represented by letters. I can solve multi-step linear inequalities in one variable.

Unit 2: Linear and Exponential Relationships	
CCS Standards: Real Number System	**Long-Term Target(s)**
N.RN.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define 51/3 to be the cube root of 5 because we want (51/3)3 = 5(1/3)3 to hold, so (51/3)3 must equal 5.*	I can describe the relationship between rational exponents and radicals.
N.RN.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	I can rewrite expressions that contain radicals and/or rational exponents using the properties of exponents.
CCS Standards: Reasoning with Equations and Inequalities	**Long-Term Target(s)**
A.REI.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. A.REI.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	I can write, solve, interpret, and justify my solution method for systems of linear equations using multiple methods (linear combination, substitution, and graphing).
A.REI.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). A.REI.11. Explain why the x-coordinates of the points where the graphs of the equations *y = f(x)* and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f(x)* and/or *g(x)* are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	I can describe and interpret the solution set of a system of equations graphically and relate that to the algebraic solution.

A.REI.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	I can describe and interpret the solutions to a system of linear inequalities graphically.
CCS Standards: Interpreting Functions	**Long-Term Target(s)**
F.IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x)*.	I can determine if a relation is a function. I can represent a function using a graph, table, and equation and describe the relationship between each form using function notation.
F.IF.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	I can evaluate a function using function notation and interpret the value in context. I can determine the domain and range of a function.
F.IF.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by* $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ *for* $n \geq 1$.	I can write a linear or exponential function from a sequence.

F.IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* F.IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* F.IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	I can interpret the graphical representation of linear and exponential functions. This means: • I can identify and interpret an appropriate domain and range. • I can interpret key elements of the graph, including average rate of change, y-intercept, x-intercepts. • I can sketch a graph showing key features given a particular scenario or context.
F.IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	I can graph linear, exponential, and quadratic functions that are expressed symbolically. This means: • I can show intercepts, maxima, and minima. • I can graph piecewise-defined functions, including step functions and absolute value functions.
F.IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	I can compare two functions that are each represented differently (graphs, tables, equations, verbal descriptions).

CCS Standards: Building Functions	Long-Term Target(s)
F.BF.1. Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	I can write, evaluate, graph, and interpret linear and exponential functions that model the relationship between two quantities.
F.BF.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	I can explain that sequences are functions and are sometimes defined recursively.
F.BF.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	I can determine the effect of a transformational constant on a linear function.
CCS Standards: Linear, Quadratic, & Exponential Models	**Long-Term Target(s)**
F.LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals; and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	I can analyze a given context to determine whether it can be modeled with a linear or an exponential function.

F.LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	I can analyze an arithmetic or geometric sequence to determine a corresponding linear or exponential function.
F.LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	I can compare and draw conclusions about graphs and tables of linear and exponential functions.
F.LE.5. Interpret the parameters in a linear or exponential function in terms of a context.	I can interpret the parameters in linear and exponential function models, in terms of their contexts.
Unit 3: Descriptive Statistics	
CCS Standards: Interpreting Categorical & Quantitative Data	**Long-Term Target(s)**
S.ID.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	I can represent data with dot plots, histograms, and box plots.
S.ID.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	I can compare the center (mean and median) and spread (interquartile range and standard deviation) of two or more data sets based on the shape of the data distribution.
S.ID.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	I can interpret differences in shape, center, and spread based on the context of the data set and determine possible effects of outliers on these measures.

S.ID.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. S.ID.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.	I can summarize, represent, and interpret categorical and quantitative data based on two variables (independent and dependent). Summarize means: • I can create a two-way frequency table. • I can interpret relative frequencies given the context of the data. • I can recognize possible associations and trends in the data. Represent means: • I can show two variable data on a scatter plot. • I can describe the relationship between the variables. • I can identify a function of best fit for the data set. • I can assess the fit of a function to a data set.
S.ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	I can interpret the slope and intercept of a linear model based on context.
S.ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.	I can compute and interpret the correlation coefficient of a linear fit.
S.ID.9. Distinguish between correlation and causation.	I can describe the difference between correlation and causation.
Unit 4: Expressions and Equations	
CCS Standards: Seeing Structure in Expressions	**Long-Term Target(s)**
A.SSE.1. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*	I can create and interpret quadratic and exponential algebraic expressions to describe real-world scenarios.

A.SSE.2. Use the structure of an expression to identify ways to rewrite it. *For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).*	I can identify the structure of a quadratic expression in order to rewrite it. This means: • I can recognize the difference of squares. • I can recognize a quadratic perfect square trinomial.
A.SSE.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	I can determine if rewriting an expression will reveal important properties of the expression. I can factor a quadratic expression in order to reveal its zeros. I can complete the square of a quadratic expression to reveal the maximum or minimum value of the function. I can use the properties of zero and 1 to produce an equivalent form of an expression.
CCS Standards: Arithmetic with Polynomials & Rational Expressions	**Long-Term Target(s)**
A.APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	I can identify a polynomial expression. I can add, subtract, and multiply polynomials.
CCS Standards: Creating Equations	**Long-Term Target(s)**
A.CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* A.CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	I can write and interpret quadratic equations and inequalities mathematically and in context, graphically and algebraically.

A.CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's Law $V = IR$ to highlight resistance* R.	I can rearrange a formula with squared exponents to highlight a particular quantity.
CCS Standards: Reasoning with Equations & Inequalities	**Long-Term Target(s)**
A.REI.4. Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	I can determine whether the solution of a quadratic equation will be real or complex. I can find real solutions to quadratic equations in one variable using multiple methods and justify my solution method.
A.REI.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$ and the circle $x2 + y2 = 3$.*	I can solve a system of equations consisting of a linear equation and quadratic equation algebraically and graphically.
Unit 5: Quadratic Equations	
CCS Standards: Real Number System	**Long-Term Target(s)**
N.RN.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	I can explain which operations are closed in the set of real numbers and its subsets of rational and irrational numbers.

CCS Standards: Interpreting Functions	**Long-Term Target(s)**
F.IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	I can analyze a quadratic model based on a verbal description. This means: • I can sketch a reasonable graph of a quadratic function based on a verbal description. • I can identify the intercepts, intervals for which the function is increasing, decreasing, positive, or negative on a graph or table. • I can determine a local maximum or minimum. • I can find the line of symmetry.
F.IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*	I can determine the appropriate domain of a quadratic function given its real-world context.
F.IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	I can use a graph to describe how a quadratic function is changing (rate of change) over a given interval. I can estimate the rate of change over a given interval from a graph.
F.IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	I can graph linear, exponential, and quadratic functions that are expressed symbolically. This means: • I can show intercepts, maxima, and minima. • I can graph piecewise-defined functions, including step functions and absolute value functions.

F.IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)t$, $y = (0.97)t$, $y = (1.01)12t$, $y = (1.2)t/10$, *and classify them as representing exponential growth or decay.*	I can analyze a quadratic or exponential function by changing the format of a function to reveal particular attributes of its graph. This means: • I can factor to find the zeros of a quadratic function. • I can complete the square to show extreme values and symmetry. I can interpret important points on a quadratic graph in terms of a context.
F.IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	I can compare properties of two functions represented differently (graphs, tables, equations, verbal descriptions) and draw conclusions based on those comparisons.
CCS Standards: Building Functions	**Long-Term Target(s)**
F.BF.1. Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	I can describe a real-world context using a quadratic model.
F.BF.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	I can describe how a quadratic function can be transformed using a constant, k. This means: • I can experiment with different transformational constants and construct an argument about their effect on a quadratic functions using technology. • I can determine the transformational constant from graph of a quadratic (shifts and stretches, both vertical and horizontal).

F.BF.4. Find inverse functions. a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2\ x3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$.	I can determine the inverse of a linear function.
CCS Standards: Linear, Quadratic, & Exponential Models	**Long-Term Target(s)**
F.LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	I can use tables and graphs to compare linear and exponential growth with quadratic growth.

Math Common Core State Standards and Long-Term Learning Targets
High School Algebra II

Traditional Pathway; see Appendix A of the CCS Standards for information on high school course design: http://www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf

Note: *Students should be able to apply all mathematical skills in context (through a word problem, open-ended real-world problem, or contextual scenario) and abstractly (in plain number problems or what the standards term "mathematical problems"). For example, when students are ask to "write, solve, and interpret two-step equations" students should be able to solve equations such as 3x + 2 = -5, and check for the validity of their solution as well as write equations from word problems.*

Unit 1: Polynomial, Rational, and Radical Relationships	
Standards: The Complex Number System	**Long-Term Target(s)**
Perform arithmetic operations with complex numbers.	
N-CN.1. Know there is a complex number *i* such that *i2* = –1, and every complex number has the form *a* + *bi* with *a* and *b* real.	I can define *i*. I can describe complex numbers in terms of their real and imaginary parts.
N-CN.2. Use the relation *i2* = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	I can apply the commutative, associative, and distributive properties to complex numbers in order to add, subtract, and multiply.
Use complex numbers in polynomial identities and equations.	
N-CN.7. Solve quadratic equations with real coefficients that have complex solutions.	I can determine when a quadratic equation has a complex solution. I can determine the complex solutions of a quadratic equation with real coefficients.
N-CN.8. (+) Extend polynomial identities to the complex numbers. *For example, rewrite x2* + 4 *as* (x + 2i)(x – 2i).	I can determine the complex factors of the sum of two squares.
N-CN.9. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	I can explain the Fundamental Theorem of Algebra. I can show that the FTA holds for all quadratic polynomials.

Standards: Seeing Structure in Expressions	
Interpret the structure of expressions	
A-SSE.1. Interpret expressions that represent a quantity in terms of its context.★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*	I can interpret algebraic expressions that describe real-world scenarios. This means: • I can interpret the parts of an expression including the factors, coefficients, and terms. • I can use grouping strategies to interpret expressions.
A-SSE.2. Use the structure of an expression to identify ways to rewrite it. *For example, see x4 – y4 as* (x2)2 – (y2)2, *thus recognizing it as a difference of squares that can be factored as* (x2 – *y2)(x2 + y2).*	I can identify common structures of an expression (such as the difference of two squares) and use that structure to rewrite it.
Write expressions in equivalent forms to solve problems	
A-SSE.4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*	I can derive the formula for a finite geometric series and use it to solve problems.
Standards: Arithmetic with Polynomials and Rational Expressions	
Perform arithmetic operations on polynomials	
A-APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	I can describe the similarities between the set of integers and the system of polynomials. I can add, subtract, and multiply polynomials. I can determine whether a set or system is closed under a given operation.
Understand the relationship between zeros and factors of polynomials	
A-APR.2. Know and apply the Remainder Theorem: For a polynomial *p(x)* and a number *a,* the remainder on division by *x – a* is *p(a),* so *p(a)* = 0 if and only if (x – *a)* is a factor of *p(x).*	I can explain the Remainder Theorem. I can apply the Remainder Theorem in order to determine the factors (or zeros) of a polynomial.
A-APR.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	I can determine the zeros of a polynomial from its factors. I can describe and sketch the graph of a polynomial given its zeros.

Use polynomial identities to solve problems	
A-APR.4. Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity* (x2 + *y2)2* = (x2 – *y2)2* + (2xy)2 *can be used to generate Pythagorean triples.*	I can prove polynomial identities algebraically. I can use a polynomial identity to describe numerical relationships.
A-APR.5. (+) Know and apply the Binomial Theorem for the expansion of (x + *y)n* in powers of *x* and *y* for a positive integer *n,* where *x* and *y* are any numbers, with coefficients determined for example by Pascal's Triangle.1	I can explain the Binomial Theorem for the expansion of $(x + y)^n$, determine patterns in powers and coefficients, and use these patterns to expand binomials of the form $(x + y)^n$.
Rewrite rational expressions	
A-APR.6. Rewrite simple rational expressions in different forms; write *a(x)/b(x)* in the form *q(x)* + *r(x)/b(x),* where *a(x), b(x), q(x),* and *r(x)* are polynomials with the degree of *r(x)* less than the degree of *b(x),* using inspection, long division, or, for the more complicated examples, a computer algebra system.	I can determine the quotient and remainder of rational expressions using inspection, long division, and/or a computer algebra system.
A-APR.7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	I can describe the similarities between the set of rational numbers and rational expressions. I can add, subtract, multiply, and divide rational expressions.
Standards: Reasoning with Equations and Inequalities	
A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	I can solve rational equations in one variable and determine extraneous solutions. I can solve radical equations in one variable and determine extraneous solutions. I can explain how extraneous solutions may arise from rational or radical equations.
Represent and solve equations and inequalities graphically	
A-REI.11. Explain why the *x-coordinates* of the points where the graphs of the equations *y* = *f(x)* and *y* = *g(x)* intersect are the solutions of the equation *f(x)* = *g(x);* find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f(x)* and/or *g(x)* are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.★	I can explain why the x-coordinates of a point of intersection of two graphs are the solution to the equation *f(x)*=*g(x)*. I can determine the approximate solutions of a system of equations using technology, tables, or successive approximations.

Standards: Interpreting Functions	
Analyze functions using different representations	
F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	I can find the key features of and then graph the following families of functions: • Linear and Quadratic (intercepts, maxima, minima) • Square root, cube root, and piecewise-defined functions. • Polynomial functions (zeros via factorization, and end behavior) • Rational functions (zeros, asymptotes, end behavior) • Exponential and logarithmic functions (intercepts, end behavior) • Trigonometric functions (period, midline, amplitude)
Unit 2: Trigonometric Functions	
CCS Standards: Trigonometric Functions	**Long-Term Target(s)**
Extend the domain of trigonometric functions using the unit circle	
F-TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	I can define the radian measure of an angle.
F-TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	I can describe the importance of the unit circle for extending trigonometric functions to all real numbers.
Model periodic phenomena with trigonometric functions	
F-TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★	I can determine the trigonometric function that best models a situation based on period, amplitude, frequency, and midline.
Prove and apply trigonometric identities	
F-TF.8. Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.	I can prove the Pythagorean Identity. I can determine the Sine, Cosine, or Tangent of an angle using the Pythagorean Identity and given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.

Unit 3: Modeling with Functions	
CCS Standards: Creating Equations	**Long-Term Target(s)**
Create equations that describe numbers or relationships	
A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and exponential functions.*	I can write equations in one variable and use them to solve problems. I can write inequalities in one variable and use them to solve problems.
A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	I can write equations in two or more variables to represent relationships between quantities. I can graph equations on coordinate axes with labels and scales.
A-CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	I can represent constraints with linear equations, inequalities, and systems of equations or inequalities. I can determine whether solutions are viable or non-viable options, given the constraints provided in a modeling context.
A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R.*	I can solve formulas for a particular variable of interest.
CCS Standards: Interpreting Functions	
Interpret functions that arise in applications in terms of the context	
F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	I can analyze and interpret the key features of a function using a graph or table. These key features include: • intercepts; • intervals where the function is increasing, decreasing, positive or negative; • relative maximums and minimums; • symmetries; • end behavior; • periodicity. I can describe and sketch a graphic representation of a function given a verbal description of the relationship.

F-IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*	I can describe an appropriate domain of a function given its real-world context.
F-IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★	I can calculate and interpret the average rate of change of a function over a specified interval. I can estimate the rate of change over a given interval from a graph.
Analyze functions using different representations	
F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ f. Graph linear and quadratic functions and show intercepts, maxima, and minima. g. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. h. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. i. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. j. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	See F-IF4 above.
F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.*	I can transform a function defined by an expression to reveal and explain different properties of the function. This means: • I can factor a polynomial to reveal zeros. • I can complete the square in a quadratic function to show zeros, extreme values, and symmetry. • I can interpret an exponential function my transforming its base. I can interpret functions in context.

F-IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	I can compare properties of two functions represented differently (graphs, tables, equations, verbal descriptions) and draw conclusions based on those comparisons.
CCS Standards: Building Functions	
Build a function that models a relationship between two quantities	
F-BF.1. Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. (+) Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*	I can determine the appropriate method for writing a function that describes the relationship between two quantities. This means: • I can determine an explicit expression, a recursive process, or steps for calculation appropriate to the context. • I can combine standard function types using arithmetic operations. • I can compose functions and determine the meaning of that composition.
Build new functions from existing functions	
F-BF.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	I can determine the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative). I can determine the translation value k, given a graph for slides, shifts, and stretches. I can explain the translation effects on the graph of a function using technology.

F-BF.4. Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, f(x) =2 x3 or f(x) = (x+1)/(x–1) for x =□ 1.* b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain.	I can determine the inverse of a function by solving *f(x)=c*. I can determine by composition that one function is the inverse of another, *f(g(x))=x*. I can determine the values of the inverse function from a graph or a table. I can describe the domain that will produce an invertible function from a non-invertible function.
Standards: Linear, Quadratic, and Exponential Models	
Construct and compare linear, quadratic, and exponential models and solve problems	
F-LE..4. For exponential models, express as a logarithm the solution to ab^{ct} =d where a, c, and d are numbers and the base b is 2,10,or e; evaluate the logarithm using technology.	I can solve exponential models using logarithms with base 2, 10, or e. I can evaluate the logarithm to find a real number approximation (using technology).
Unit 4: Inferences and Conclusions from Data	
CCS Standards: Interpreting Categorical and Quantitative Data	**Long-Term Target(s)**
Summarize, represent, and interpret data on a single count or measurement variable	
S-ID.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	I can determine when a data set warrants a normal distribution. I can determine the mean and standard deviation of a data set and fit it to a normal distribution. I can estimate population percentages based on mean, standard deviation, and distribution. I can estimate the areas under the normal curve using calculators, spreadsheets, and tables.
Standards: Making Inferences and Justifying Conclusions	
Understand and evaluate random processes underlying statistical experiments	
S-IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	I can define statistics in terms of inferences, population parameters, and random sampling.

S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*	I can decide if a model is consistent with results, given a data-generating process such as simulation.
Make inferences and justify conclusions from sample surveys, experiments, and observational studies	
S-IC.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	I can compare and contrast sample surveys, experiments, and observational studies. I can explain how randomization relates to sample surveys, experiments, and observational studies.
S-IC.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	I can estimate a population mean or proportion given data from a sample survey. I can determine the margin of error using simulation models for random sampling.
S-IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	I can compare two treatments using data from a randomized experiment. I can decide if differences are significant by using simulations.
S-IC.6. Evaluate reports based on data.	I can evaluate reports based on data.
Standards: Using Probability to Make Decisions	
Use probability to evaluate outcomes of decisions	
S-MD.6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	I can analyze probabilities to make fair decisions.
S-MD.7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	I can analyze decisions and strategies using probability concepts.

Math Common Core State Standards and Long-Term Learning Targets
High School Geometry

Traditional Pathway; see Appendix A of the CCS Standards for information on high school course design: http://www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf

Unit 1: Congruence, Proof, and Constructions	
Standards: Interpreting Congruence	**Long-Term Target(s)**
Experiment with transformations in the plane	
G-CO1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	I can define the following terms precisely in terms of point, line, distance along a line, and arc length: *angle, circle, perpendicular line, parallel line, line segment.*
G-CO2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	I can represent transformations visually (e.g. by using manipulatives and/or geometry software). I can describe transformations as functions with inputs and outputs. I can compare transformations that preserve congruence with those that do not.
G-CO3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	I can describe the lines of symmetry in rectangles, parallelograms, trapezoids, and regular polygons in terms of the rotations and reflections that carry each shape onto itself.
G-CO4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	I can develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
G-CO5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	When given a geometric figure and a specific transformation, I can draw the transformed figure by using graph paper, tracing paper, or geometry software. Given two figures, I can specify a sequence of transformations that will carry one figure onto another.
Understand congruence in terms of rigid motions	
G-CO6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	I can transform a figure using a geometric description of a rigid motion. I can predict what effect a transformation will have on a figure. Given two figures, I can determine if they are

	congruent using properties of rigid motion.
G-CO7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	I can show that triangles are congruent if and only if their corresponding sides and angles are congruent.
G-CO8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	I can prove the following triangle congruence theorems (ASA, SAS, SSS) using properties of rigid motion.
Prove geometric theorems	
G-CO9. Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	I can prove the following theorems about lines and angles: • vertical angles are congruent; • when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; • points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.
G-CO10. Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*	I can prove the following theorems about triangles: • the measures of interior angles of a triangle sum to 180°; • the base angles of isosceles triangles are congruent; • the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; • the medians of a triangle meet at a point.
G-CO11. Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*	I can prove the following theorems about parallelograms: • opposite sides are congruent; • opposite angles are congruent; • the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

Make geometric constructions	
G-CO12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*	I can perform the following geometric constructions using a variety of tools (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.): • copying a segment; • copying an angle; • bisecting a segment; • bisecting an angle; • constructing perpendicular lines, including the perpendicular bisector of a line segment; • constructing a line parallel to a given line through a point not on the line.
G-CO13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	I can construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
Unit 2: Similarity, Proof, and Trigonometry	
Standards: Similarity, Right Triangles, and Trigonometry	**Long-Term Target(s)**
Understand similarity in terms of similarity transformations	
G-SRT1. Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	Given a center and scale factor, I can verify that dilating a figure: • leaves any lines passing through the center of the figure unchanged; • takes a line not passing through the figure's center to a parallel line; • makes dilations of line segments longer or shorter in the ratio given by the scale factor.
G-SRT2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	Given two figures, I can apply the definition of similarity in terms of similarity transformations to: • decide if the two figures are similar; • explain the meaning of similarity for triangles.
G-SRT3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	I can apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
Prove theorems involving similarity	
G-SRT4. Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem*	I can prove two theorems using triangle similarity: the theorem that a line parallel to one side of a triangle divides the other two

proved using triangle similarity.	proportionally, and the Pythagorean theorem.
G-SRT5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	I can prove theorems about geometric figures using triangle congruence and similarity.
Define trigonometric ratios and solve problems involving right triangles	
G-SRT6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	I can explain how to derive the trigonometric ratios for acute angles.
G-SRT7. Explain and use the relationship between the sine and cosine of complementary angles.	I can explain the relationship between the sine and cosine of complementary angles. I can apply the relationship between sine and cosine of complementary angles to solve mathematical problems.
G-SRT8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★	I can solve right triangle problems using trigonometric ratios and the Pythagorean Theorem.
Apply trigonometry to general triangles	
G-SRT9. (+) Derive the formula $A = 1/2\ ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	I can derive the formula for the area of a triangle using trigonometric ratios and the Pythagorean Theorem.
G-SRT10. (+) Prove the Laws of Sines and Cosines and use them to solve problems.	I can prove the Law of Sines. I can prove the Law of Cosines. I can apply the Laws of Sines and Cosines to problems.
G-SRT11. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	I can apply the Law of Sines and Cosines to problems involving unknown measures in right and non-right triangles.
Standards: Modeling with Geometry	**Long-Term Target(s)**
Apply geometric concepts in modeling situations	
G-MG1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★	I can describe real world objects using the measures and properties of geometric shapes.
G-MG2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★	I can explain how density relates to area and volume and apply it to multiple situations.
G-MG3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★	I can apply geometric methods to solve design problems.

Unit 3: Extending to Three Dimensions	
Standards: Geometric Measurement and Dimension	**Long-Term Target(s)**
Explain volume formulas and use them to solve problems	
G-GMD1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*	I can explain why these formulas work: • the formula for the circumference of a circle; • the area formula for a circle; • the volume formulas of a cylinder, pyramid, and cone.
G-GMD3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	I can apply formulas for cylinders, pyramids, cones, and spheres to multiple problems.
Visualize relationships between two-dimensional and three- dimensional objects	
G-GMD4. Identify the shapes of two-dimensional cross-sections of three- dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	I can determine the two-dimensional cross-section of a three-dimensional object. I can determine the three dimensional object generated by rotating a two-dimensional object.
Standards: Modeling with Geometry	**Long-Term Target(s)**
Apply geometric concepts in modeling situations	
G-MG1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★	I can describe real world objects using the measures and properties of geometric shapes.
Unit 4: Connecting Algebra and Geometry Through Coordinates	
Use coordinates to prove simple geometric theorems algebraically	
G-GPE4. Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*	I can prove geometric theorems algebraically by using coordinate points.
G-GPE5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	I can determine the equation of a line parallel or perpendicular to a given line that passes through a given point.
G-GPE6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	I can determine the coordinates of the point on a line segment that divides the segment into a given ratio.

G-GPE7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★	I can compute the area and perimeter of triangles and rectangles in the coordinate plane. I can compute the perimeters of polygons in the coordinate plane.
Translate between the geometric description and the equation for a conic section	
G-GPE2. Derive the equation of a parabola given a focus and directrix.	I can derive the equation of a parabola given a focus and directrix.
Unit 5: Circles With and Without Coordinates	
Standards: Circles	**Long-Term Target(s)**
Understand and apply theorems about circles	
G-C1. Prove that all circles are similar.	I can prove that all circles are similar.
G-C2. Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*	I can identify and describe relationships among inscribed angles, radii, and chords.
G-C3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	I can construct the inscribed and circumscribed circles of a triangle. I can prove properties of angles for a quadrilateral inscribed in a circle.
G-C4. (+) Construct a tangent line from a point outside a given circle to the circle.	I can determine the equation of a tangent line given the circle and a point outside the circle.
Find arc lengths and areas of sectors of circles	
G-C5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	I can determine the relationship between an arc intercepted by an angle and the radius. I can describe radian measure in terms of proportionality. I can determine the formula for the area of a sector.
Standards: Expressing Geometric Properties with Equations	**Long-Term Target(s)**
G-GPE1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	I can derive the equation of a circle given its center and radius. I can determine the center and radius of a circle given its equation.

Use coordinates to prove simple geometric theorems algebraically	
G-GPE4. Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*	I can prove geometric theorems using algebra.
Standards: Modeling with Geometry	**Long-Term Target(s)**
Apply geometric concepts in modeling situations	
G-MG1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★	I can describe real-world objects using the measures and properties of geometric shapes.
Unit 6: Applications of Probability	
Standards: Conditional Probability and the Rules of Probability	**Long-Term Target(s)**
Understand independence and conditional probability and use them to interpret data	
S-CP1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	I can describe subsets of a sample space in terms of outcomes, unions, intersections, and complements.
S-CP2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	I can determine whether two events are independent based on their probability.
S-CP3. Understand the conditional probability of *A* given *B* as *P(A* and *B)/P(B),* and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A,* and the conditional probability of *B* given *A* is the same as the probability of *B.*	I can explain the conditional probability of A given B. I can explain independence of A and B using conditional probability.
S-CP4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*	I can construct and interpret two-way frequency tables of data when two categories are associated with each object. I can determine independence of events using a two-way table as a sample space. I can approximate conditional probabilities using a two-way table as a sample space.

S-CP5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	I can distinguish between conditional probability and independence in everyday language and everyday situations.
Use the rules of probability to compute probabilities of compound events in a uniform probability model	
S-CP6. Find the conditional probability of *A* given *B* as the fraction of *B's* outcomes that also belong to *A,* and interpret the answer in terms of the model.	I can determine the conditional probability of two events and interpret the solution within a given context.
S-CP7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.	I can calculate the probability P(A or B) by using the Addition Rule. I can interpret the solution to P(A or B) in the given context.
S-CP8. (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.	I can calculate the probability of compound events and interpret the solution in context.
S-CP9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.	I can calculate the probabilities of compound events using permutations and combinations.
Standards: Using Probability to Make Decisions	**Long-Term Target(s)**
Use probability to evaluate outcomes of decisions	
S-MD6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	I can evaluate the fairness of a decision using probabilities.
S-MD7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	I can analyze decisions and strategies by using probabilities.